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Claims

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1. Actuator, comprising a housing (1), which contains a motor (2) and a screw mechanism (3), said screw mechanism (3) comprising a screw (16) and a nut (17) one of which is rotatably supported with respect to the housing (1), and a gear reduction mechanism (4) connecting the rotor (7) of the motor (2) to the rotatable screw (16) or nut (17), said gear reduction mechanism (4) comprising at least a concentric gear ring (25) with radially inwardly directed teeth, an eccentrically positioned gear wheel (24) having radially outwardly directed teeth wherein the outer diameter of the gear wheel (24) is smaller than the inner diameter of the gear ring (25), such that the teeth of said gear wheel (24) and gear ring (25) engage each other along a part of their circumferences, and at an opposite part of their circumferences are out of engagement, said eccentric gear wheel (24) being rotatable accommodated on an eccentric hub (23) which is connected to the rotor (7) of the motor (2), characterised in that the gear ring (25) is integrated with the screw (16) of the screw mechanism (3), said screw (16) being rotatably supported with relation to the housing (1).

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Claims

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1. Actuator, comprising a housing (1), which contains a motor (2) and a screw mechanism (3), said screw mechanism (3) comprising a screw (16) and a nut (17) one of which is rotatably supported with respect to the housing (1), and a gear reduction mechanism (4) connecting the rotor (7) of the motor (2) to the rotatable screw (16) or nut (17), characterized in that the gear reduction mechanism (4) comprises at least a concentric gear ring (25) with radially inwardly directed teeth, an eccentrically positioned gear wheel (24) having radially outwardly directed teeth wherein the outer diameter of the gear wheel (24) is smaller than the inner diameter of the gear ring (25), such that the teeth of said gear wheel (24) and gear ring (25) engage each other along a part of their circumferences, and at an opposite part of their circumferences are out of engagement, said eccentric gear wheel (24) being rotatable accommodated on an eccentric hub (23) which is connected to the rotor (7) of the motor (2).

15. 2. Actuator according to claim 1, wherein the gear ring (25) is integrated with the screw (16) of the screw mechanism (3), said screw (16) being rotatably supported with relation to the housing (1).

20. 3. Actuator according to claim 1 or 2, wherein the rotor (7) of the motor (2) is rotatably supported on the outer ring (10) of a support bearing (11), said outer ring (10) being integrated with the screw (16) and the gear ring (25).

25. 4. Actuator according to claim 3, wherein the rotor (7) by means of a radially inwardly extending flange (21) is connected to the eccentric hub (23).

30. 5. Actuator according to claim 4, wherein a positive back-drive mechanism (30) is connected to the flange (21) and the housing (1).

35. 6. Actuator according to claim 5, wherein the positive back-drive mechanism is a spiral spring (30).

40. 7. Actuator according to any of the preceding claims, wherein the eccentric gear

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wheel (24) is rotatably supported with respect to the eccentric hub (23) by means of a rolling element bearing (30).

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8. Actuator according to any of the preceding claims, wherein the motor (2) is  
5 an electric motor, the stator (6) of which is connected to the housing (1).

9. Actuator according to any of the preceding claims, wherein the gear reduction  
mechanism (4) is at the end of the screw mechanism (3) opposite the end thereof  
engaging an actuating means (38) for a brake pad (39).

10. Actuator according to any of the preceding claims, wherein the screw (16) of  
the screw mechanism (3) is rotatably supported by means of a support bearing (11)  
with respect to a central support shaft (13), the gear ring (23) and the gear wheel (24) of  
the reduction gear mechanism (4) surrounding said central support shaft (13).

15. 10. Actuator according to any of the preceding claims, wherein the screw (16) has  
a bore (35) containing a lubricant reservoir (36).

11. 11. Actuator according to any of the preceding claims, wherein the gear reduction  
20 mechanism (4) and a positive back-drive mechanism (37) are contained in a gear  
reduction module (40).

12. 12. Actuator according to any of the preceding claims, wherein the gear reduction  
module (40) comprises a central support shaft (13) for supporting the screw mechanism  
25 (3).  
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13. 13. Actuator according to any of the preceding claims, wherein the screw  
mechanism (3), a support bearing (11) for supporting the screw mechanism (3), the  
30 rotor (7) of the motor (2) as well as a bearing (9) for supporting the rotor (7) on the  
screw mechanism (3) are contained in a actuator module (41).

14. 14. Actuator according to any of the preceding claims, wherein the housing (1).

the stator (6) and electric connections for the motor (2) are contained in a housing module (42).

16. Actuator according to one claim 1, comprising a housing (55), a nut (55) and a screw (56) one of which is axially fixed with respect to the housing (51) and the other of which is axially displaceable with respect to the housing (51) for moving an actuating head (71), as well as a motor (57) which comprises a stator (58) connected to the housing (51), and a rotor which is drivingly connected to a rotatable part (56) of the screw actuator (54), the housing (51) having a bore (60) accommodating at least the nut (55) and/or screw (56), an axially fixed part (55) of said nut (55) or screw (56) being supported with respect to a radial support abutment (61) which extends inwardly in the bore (60), wherein the rotor (59) of the motor (57) is supported rotatably on a sleeve (63), said sleeve (63) engaging the fixed part (55) and extending away from the actuating head (71), said sleeve (63) having a radially outwardly extending sleeve flange (64) which is interposed between said support abutment (61), and the axially fixed part (55).

17. Actuator according to claim 16, wherein the flange (54) of the sleeve (63) is supported on an abutment surface (62) of the support abutment (61) which faces an actuating head (71) connected to the axially displaceable nut (55) or screw (56) for exerting a compressive force.

18. Actuator according to claim 16 or 17, wherein the nut (55) is fixedly supported within the housing (51), said nut (55) having a radially outwardly extending nut flange (65) facing the outwardly extending sleeve flange (64) and overlapping the inwardly extending support abutment (61).

19. Actuator according to claim 18, wherein the outwardly facing surfaces of sleeve flange (64) and the nut flange are curved in axial cross section, so as to allow swivelling or tilting of said nut and sleeve due to misalignment forces.

20. Actuator according to claim 18 or 19, wherein the nut (55) has a nut extension (66) extending beyond the nut flange (65) and inside the support abutment (61), the sleeve (63) having an axially extending support part (67) which is accommodated between said nut extension (66) and the support abutment (61).

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31. Actuator according to claim 30, wherein the gear wheel mechanism (4) is connected to a central drive shaft (76) which is rotatably supported in the housing (51) and which extends into a bore (77) in the screw (76), said drive shaft (76) being non-rotatably coupled to the screw (56) through a spline/groove mechanism.

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32. Actuator according to claim 31, wherein a lubricant dosing module (79) is accommodated in the bore (60) of the screw (66).

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33. Brake calliper, comprising a claw piece with at least two brakes, and an actuator according to any of the preceding claims.